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**Chapter 14: Animals**

**Classification of Animals**

* The animal kingdom is divided into 16 phyla.
* There are 1,200,000 known species
* The animal kingdom is divide into vertebrates and invertebrates
* All animals are multicellular.

**Sponges and Coelenterates**

* Sponge Animals
* Some live in salt water and some live in fresh water.
* They have asymmetrical bodies.
* The body is a hollow tube that allows water to flow through which brings water and oxygen to the sponge cells.
* The skeleton is made up of calcium carbonate, silicon, or aspongin (a soft and flexible material).
* Some sponges are collected by divers and sold for human use.
* They may be white, red, orange, yellow, green, purple, brown, or black.
* Sponges reproduce sexually or asexually by budding.
* Sponges can regrow lost parts.
* Hydra, Jellyfish, Sea Anemone, and Coral
* Cnidarians-General Characteristics
* Body walls are two cells thick.
* They have a mouth that is surrounded by tentacles.
* Their bodies are symmetric.
* They have two different body forms during their life: polyp and medusa.
* They can produced sexually and asexually.
* Hydra
* They live in fresh water.
* They can be white, brown, or green.
* Can regrow lost parts.
* Jellyfish
* Many are transparent.
* They live in seawater.
* The mouth is on the underside of the body.
* The tentacles have a thousand of stinging cells.
* They are found close to the surface of the water.
* Sea anemone
* They attach to rocks.
* Many are brightly colored.
* They reproduce sexually and asexually.
* Coral
* They live in large colonies.
* They live in ocean water that is at least 68 degrees F.
* When corals die their skeletons remain.
* They are commonly found near islands.
* They protect shorelines from ocean storms.

**Worms**

* The Non Segmented Flatworms
* Flat and ribbionlike
* Have bilateral symmetry
* Planarians, tapeworms, and flukes are in this category.
* They live in fresh water or damp soil.
* They can be brown, black, or white.
* They have triangular heads.
* They eat tiny aquatic animals or dead plant or animal material.
* They move by using cilia.
* Can reproduce sexually or asexually
* Nonsegmented Roundworms
* Digestive track is the entire length of its body.
* Some are parasitic and others are non parasitic.
* They live in soil, fresh water, ocean water, or on an animal or human host.
* Some examples: ascaris, hookworm, pinworm, trichinella
* Segmented Roundworm
* Members include the earthworm, sandworm, and leech.
* Can be found on land and in the water.
* They are the most highly developed of the worms in terms of organs, digestive system, reproductive and other body systems.

**Echinoderms and Mollusks**

* The spiny-skinned animals
* They live in salt water.
* They have a five part radially symmetric body.
* They have a hard, spiny calcium carbonate exoskeleton covered by a layer of skin.
* Examples: Starfish, brittle star, sea urchin, sand dollar, sea cucumber, feather star, and sea lily
* Shellfish
* They have soft, non segmented, fleshy bodies.
* Most have aprotective shell of calcium carbonate.
* There are seven classes in this phylum. They three most common are: bivalia, gastropoda, and cephalopoda.
* Bivalved mollusks in oceans and fresh water.
* Bivalved mollusks never shed their shells.
* Bivalved mollusks include oysters, clams, and mussels.
* Gastropods (most) have spiral shaped shells.
* Some have lungs instead of gills for breathing.
* Gastropods include snails and slugs.
* Cephalopods are marine only.
* Most cephalopods can camouflage by changing color.
* They include squid, octopuses, and cuttlefish.

**Arthropods**

* Characteristics of Arthropods
* They are animals with jointed appendages.
* They have an exoskeleton.
* Their bodies are divided into segmented regions.
* They have bilateral symmetry.
* Crustaceans
* They include the lobster, crab, shrimp, crayfish, water flea, and the pill bug.
* They have ten legs.
* They have two antennae.
* They have two body regions: the cephalothorax and abdomen.
* Most use gills to breath.
* Insects
* They have three body regions: head, thorax, and abdomen.
* They have antennae attached to their heads.
* They three pairs of legs.
* Most have two pairs of wings.
* Most have simple and compound eyes.
* From the time they are born to adulthood they will pass through metamorphosis.
* Insects include: flies, dragonfly, butterfly, moths, beetles, crickets, bees, ants, spiders, ticks, mites, scorpions, just to name a few.

**Vertebrates**

* They have a dorsal hollow nerve.
* Most have an internal skeleton.
* Most have two pair of limbs.
* Fish, amphibians, reptiles, birds, and mammals are vertebrates.

**Fish**

* Three classes of fish: bony fish, lampreys, and sharks and rays.
  + Bony fish have skeletons of bone.
  + Lampreys, sharks, and rays have skeletons made up of cartilage.
* Only live in water (oceans, lakes, ponds, rivers, and brooks)
* Some live alone, others travel in large groups, or schools.
* Eat a variety of foods. Some fish eat algae and aquatic plants. Some eat foods like insects, worms, crayfish, snails, and other fish.
  + Carnivorous fish have sharp teeth that slant backward, making it easy for the fish to swallow their food and making it hard for the prey to escape.
  + Can use teeth to seize, tear, and hold their prey, however, fish cannot chew.

**Physical Characteristics of fish**

* Three parts of a fish: head, body, and tail.
  + The head has no neck and is attached to the body.
  + Body is streamlined and is the largest part of the fish.
  + Tail is narrow.
* Bodies of most fish are covered with scales.
* Fish are all kinds of different colors.
* Fish are dark-colored on top and light-colored beneath. This is a camouflage pattern that helps fish avoid being seen by their enemies from above and/or below.
* Fish have large eyes but no eyelids.
  + Because the fish eye is large, it can admit a large amount of light.
* Body of a fish has several appendages called fins.
  + The pectoral fins are near the head.
  + Pelvic fins correspond to the rear legs of land vertebrates.
  + The one (to two) dorsal fins are along the backside of the body.
  + Caudal fin is the end of the fish’s tail and is along the front side of the body, toward the tail.
* Fish are ectothermic animals.

**How Fish Breathe**

* Fish have gills, respiratory organs located on each side of the head.
  + Fish obtain oxygen from water by opening and closing their mouths.
  + There are four or five gills in each gill chamber.
  + Fish are more active in cool water than in warm water.

**How Fish Move**

* Fish swim rapidly by moving its tail and tailfin from side to side.
* Dorsal fins are for balance.
* Fish have a swim bladder making it possible for the fish to rise, sink, or stay at a particular depth.

**How Fish Reproduce**

* Most fish develop from eggs that are deposited outside of a female fish’s body.
  + Some freshwater fish tropical fish develop inside the female’s body and are born alive.

**The Conservation of Fish**

* Fish are an important source of food for humans.
* Ground fish, fishmeal, is used in making foods for cats, dogs, and chickens.
* Many people catch fish for sport, recreation, and food.
* Fish oil is used in making paints.
* Glue is made from the bones and other body parts of fish.
* Fish are lost from bodies of water, usually because of human interference.
* States have passed many laws to protect and conserve fish.
  + There are restrictions regarding the catching fish.
* Federal and state governments have established fish hatcheries to breed and raise fish for lakes and streams.

**The Cartilaginous Fish**

* Lamprey
  + Some live in saltwater others live in freshwater.
  + Resembles an eel.
  + Skeleton made of cartilage.
  + Soft, slimy skin.
  + Only have two fins along its back and one tail fin.
  + Has a round sucking mouth lined with sharp teeth with a tongue that has teeth on it as well.
  + The lamprey is a parasite, which means it lives off of the blood of other fish.
* Sharks
  + Only lives in saltwater.
  + Feeds on live or dead fish and sea animals.
  + Tiger shark is deadly that will eat almost anything dead or alive.
    - Live mainly in tropical, coastal waters.
    - Have electrical sensors that sense even the tiniest muscle movement. Helps in dark waters.
    - Acute sense of smell.
  + Great white shark
    - Largest predatory shark.
    - May live as long as 50 years.
    - One of the most fastest and most dangerous predators.
* Ray
  + - Known as the devilfish, stingray, or blanket fish.
    - Lives only in saltwater and lies half buried in the sand.
    - Long tail is used to wound prey. It has a sharp spine that penetrates its victims and causes tissue damage, infection, swelling, and severe pain.

**Amphibians**

* Frogs, toads, and salamanders.
* Live in water when they are young, however, when they become adults they live mostly on land. (Amphibia means, “Double life”).
* Metamorphosis occurs when young amphibians change into adults.
* Bodies are covered in thin, loose, moist, skin.
* Webbed feet.
* Eggs are fertilized externally.
* Are ectothermic, but can raise their body temperature above the air around them for short periods.

**The Frog, the Toad, and the Salamander**

* There are a variety of different sizes and colors and are found in different habitats.
* Frog has a short, broad body.
* Frog’s skin is like the surroundings the frog inhabits.
* On land, the frog breathes through lungs. In water, it breathes through its skin.
* Some frogs are poisonous.
* Large, bulging eyes with upper and lower lids.
  + Frogs have a third eyelid that protects the eye when the frog is underwater and keeps the eye moist when the frog is on land.
* Frog has a large mouth and a long sticky tongue used to catch its prey.
* Frog has two short front legs with four toes.
* Frog has two hind legs used for swimming and leaping.
* The frog has a three-chambered heart.
* Frogs and toads have vocal cords capable of producing sounds.
* Fertilization is external.
* Female frogs lay eggs, usually black and white.
* Young frog that hatches from the egg is called a tadpole.
* Each species is different, however, development and metamorphosis into an adult can take 3 weeks to 28 years.
* Frogs hibernate in the winter.
* Frogs also go through estivation. During the summer, the frog buries itself in the cool mud and become inactive.
* Leopard Frog
  + One of the most common in the United States.
* Bullfrog
  + Large.
  + Lives mostly in water
  + Humans sometimes eat legs of bullfrogs.
* Tree Frog
  + Very small.
  + Spends its life in tress.
  + Makes a very loud sound.
* Toads
  + Frogs that are called toads have drier, bumpier skin.
  + Have shorter legs then the frog.
  + Lives on land all the time.
  + Have no teeth.
  + Cannot swim as well as other frog species.
  + Bumps on its back, sides, and legs contain poison glands that protect the toad.
  + Sleeps most of the day under rocks and logs.
  + Becomes active at night.
  + Feeds on insects and slugs.
* Salamanders
  + Looks like a lizard.
  + May have short legs or no legs, depending on the species.
  + Has soft, moist skin.
  + Has no claws.
  + Some live in water, others live in damp laces on land.
  + Japanese salamander is the world’s largest salamander.
  + The newt has a “triple life”. Meaning it lives in the water and breathes through gills. Then it lives on land and breathes through lungs. Later it returns to the water, breathing through lungs when on the surface and through skin when underwater.

**Reptiles**

* Have a backbone.
* Skeletons are inside their body.
* Most have two pairs of appendages attached to their bodies at the shoulder and hip.
* Snakes, turtles, lizards, and alligators.
* Have rough, thick, dry skin covered with scales.
* Some have feet, and those feet have claws on their toes.
* Breathe only through lungs.
* Have a breastbone (sternum) that protects the heart and lungs.
* Internal fertilization.
* Female’s eggs are laid on the ground after fertilization.
* Ectothermic: regulating behavioral activity can maintain body temperature.
* Most have three-chambered hearts.
  + Crocodile and alligator have four-chambered hearts.
* Turtle
  + Some live in saltwater, others live in freshwater, and others live on land.
  + Land turtles are called tortoises.
  + Turtles have an upper and lower shell. The body is located between the shells.
  + Shell protects the turtle.
  + Have no teeth.
  + Well-developed eyes and eyesight with upper and lower eyelids.
    - Has a third eyelid. It is transparent and moves from the front corner of the eye to cover and protect the eyeball.
  + Has short legs and walks slowly.
  + Skin is scaly and tough.
  + Some turtles have webbed toes.
  + Some turtles have tails.
  + Fertilization is internal.
  + Females lay their eggs on land in shallow holes. The eggs are covered with sand or dirt. The heat of the sun helps incubate the eggs.
  + Turtles are a major protein food for humans throughout the world.
* The Lizard
  + Many types of habitats. Can be found throughout the world, except in cold regions.
  + Most have four legs. Some have no legs.
  + Distinct eyelids.
  + If their tails break off, many lizards can regenerate a new one.
  + Chameleons
    - Tree-dwelling lizards that can change color repeatedly in consequence to heat, light, and emotion.
    - 80 species (most live in Africa).
  + Horned Toad
    - Really a lizard.
    - Western United States.
    - Can squirt blood from its eyes to surprise or frighten its enemy.
  + Gila Monster
  + Beaded Lizard
    - Only poisonous lizards.
    - Bites hard and ferociously.
  + Iguanas
    - Large family of lizards
    - Found in the tropics.
    - Green Iguana lives in treetops.
    - Endangered and faces extinction.
    - Galapagos Marine Iguanas are the only lizards that feed in the ocean.
  + Geckos
    - Small nocturnal lizards.
    - Live in warm, tropical climates.
* The Snake
  + Bodies are long and round and are covered in scales.
  + Often colorful.
  + Eyes are covered with clear scales that are always open.
  + Molt (shed) outer layer of scales several times during a season.
  + Snakes have no legs, however, some can swim and climb.
  + Most move slow.
  + Moves by using scales (scutes) on the underside of the body and muscles.
  + Commonly move by winding from side to side and forming curves.
  + Some move up and down in a straight line.
  + Some snakes live in the desert. They have a side-winding movement.
  + Snakes have only inner ears.
  + Large mouth with a double row of teeth on each side of its upper jaw and a single row of teeth in its lower jaw.
  + Swallows its food whole.
  + Has a flexible jaw that can dislocate. Allows snakes to swallow victims that are thicker than its body.
  + Can go long periods without eating (up to a year).
  + No eyelids.
  + Eat only animals.
  + Most poisonous snake in the United States is the coral snake (southeast).
  + World’s longest poisonous snake is the king cobra (asia).
  + Most snakes lay eggs that are tough, leathery, and white.
* The Alligator and the Crocodile
  + Large reptiles.
  + Live mostly in tropical and semitropical climates. Usually in swamps and the banks of rivers.
  + Most advanced of the reptiles.
  + Covered with large, bony scales.
  + Legs have toes that are partly webbed.
  + Eat fish and any other land animal that comes through their path.
    - Do not chew their food, but swallow it whole.
  + Both attack humans.
  + Females lay eggs after internal fertilization. Eggs are laid in a nest of mud and vegetation.
    - The mother protects the babies after they hatch.
    - Babies are completely independent at birth and grow to adults in 6 years.
  + *Crocodile* 
    - Found in Africa and India. Also some in the southeastern U.S, China, and Central and South America.
    - Has a narrow, more triangular head. Its snout is pointed.
    - Smaller and less bulky than the alligator.
    - Grayish green
    - More active then the alligator.
    - Pair of enlarged teeth in the lower jaw that fit into a notch on each side of its snout.
    - Spends more time in the water.
    - More prone to attack humans.
  + *Alligator*
    - Found in the southeastern U.S.
    - Brown
    - Sluggish, especially on land.
    - All teeth in the upper jaw overlap with the teeth in the lower jaw.

**Birds**

* Bodies are covered with feathers.
* Light, compact skeletons with hollow bones containing air spaces.
* Birds have wings they use for flying.
* Stand and perch on two legs.
* Have horny beaks and no teeth.
* Eggs are fertilized internally.
  + Female’s eggs have a protective shell.
* Endothermic; they can regulate their body temperature to keep it constant.
* Vary in size and shape.
  + Smallest is the hummingbird.
  + Largest is the ostrich.
* Bald eagle is the national bird of the United States (1782).
* Bird feathers are modified scales.
  + Grow from little pits in the skin
  + Feathers are widely different in color depending on species and gender.
  + Birds shed, or molt, their feathers once a year.
* Have keen eyesight and hearing, good balance, and excellent memory on how to get from place to place.
  + Have large eyes that give them sharp eyesight and help them adept at judging distances.
  + Some birds also have a good sense of smell.
* Most birds have a voice. Some (about half of the known species) can sing.
  + Bird songs are used to establish territorial rights, to indicate change in aggression, and direct their communication to one another.
* Birds are among the world’s fastest animals.

**Where Birds Live**

* Birds live in all parts of the world.
* Many migrate.
  + Reasons why birds migrate include; climate changes, low or no food supply, and breeding.
  + Some birds have very long migration flights.

**What Birds Eat**

* Birds need large amounts of food.
* Two main foods include insects and seeds.

**How Birds Reproduce**

* Birds have elaborate pre-mating courtship rituals and patterns.
* Internal fertilization.
* Female lays a number of eggs with hard shells.
* Female’s sit on their eggs and incubate them.

**The Nesting Habits of Birds**

* Birds build nests to provide a place for their eggs and to protect their babies after they hatch.
* Nests vary in size, shape, and materials.
  + Soil, clay, twigs, grass, stems, leaves, bark, hair, feathers, and string.

**Bird Bills, Feet, Wings, and Tails**

* The development of different kinds of feet depends on whether they are adapted for perching, climbing, swimming, wading, or grasping.
  + Birds have bills for gathering food and eating.
  + Shape of the wings is adapted for the kind of flying the bird does.
  + Bird’s tail acts as a udder in flying and a balance in perching.

**Conservation and Protection of Birds**

* The destruction of nesting sites by humans has destroyed large numbers of songbirds and game birds.
* Forests are cut, underbrush is cleared, fields are burned, drainage of marches and wetlands and the lowering of water levels in lakes and ponds that removes the food supply and nesting sites of water fowl contribute to the vast numbers of birds that are killed.
* Birds are killed for sport and for food.
* State and national government pass laws to protect and conserve bird wildlife.

**Mammals**

* All have hair on their bodies.
* Many have fingernails and toenails.
* Lungs for breathing.
* Endothermic, able to regulate body temperature to keep it constant.
* Have seven neck bones.
* Two pairs of limbs.
* Different numbers of toes on their legs.
* Babies are born alive.
* Internal fertilization
  + Young develop inside the mother.
  + Gestation period is different for different types of mammals.
  + Care for their young after birth.
  + The female nurses the young by giving them milk from special glands called mammary glands.
* Adults vary in size.
* Live all over the world.
  + Many live on land.
  + A large number live in temperate climates.
* May be herbivores, carnivores, or omnivores.
* Some move to different locations at different seasons of the year (migrate).
* Some are inactive all winter.
  + Hibernation
  + “Winter sleep”

**Egg-Laying Mammals**

* Australian duck-billed platypus and spiny anteater.
  + Lay eggs

**Pouched Mammals**

* Marsupials
* Kangaroo, opossum, koala, numbat, spotted cuscus, sugar glider, wombat, and wallaby.
* Most live in Australia.
* Young are helpless when they are born.

**“Toothless Mammals”**

* Not completely toothless, but have no teeth in front.
* Sloth, armadillo, and great anteater.

**Insect-Eating Mammals**

* Mole, shrew, and the hedgehog.

**Flesh-Eating Mammals: The Carnivores**

* Large, well-developed canine teeth located near the corners of the mouth, and strong jaws for tearing flesh.
* Other teeth are pointed and help cut flesh.
* Carnivores
* Seal, walrus, and sea lion.
* Bear family
  + Seven species
    - American black bear
    - Brown bear
    - Polar bear
    - Grizzly bear
    - Kodiak bear
  + Omnivorous
  + Largest members of the bear family are the polar bear and the Kodiak bear.
  + Some species are considered endangered and conservation projects and regulated hunting have allowed for numbers of species to rise.
* Feral cats
  + 37 species
  + Varies in size.
  + Numbers are in decline, mainly because of poaching for medicines, hunting for fur, and habitat degradation.
  + Bengal tiger
  + Largest living cat is the Siberian tiger.
  + Lions
    - Found only in Africa and western India.
  + Leopards
    - Wildest distribution of any large cat.
  + Jaguar
    - The only large cat that does not roar.
  + Cheetah
    - Found in Africa and Asia
    - Fastest land mammal.

**Gnawing Mammals: The Rodents**

* Rat, mouse, squirrel, chipmunk, prairie dog, woodchuck, rabbit, hare, muskrat, and beaver.
* Have two large, chisel-like front incisor teeth on each jaw.
  + Rabbit and hare have four of these teeth on each jaw.
  + Teeth keep growing.

**Hoofed Mammals**

* Odd-toed
  + Horse and rhinoceros
* Even-toed
  + Cud-chewers
    - Cow, sheep, goat, camel, giraffe, and deer.
  + Non-cud-chewers
    - Pig and the hippopotamus
* Some have horns.
  + Cow, ox, and bison have hollow horns that are never shed.
  + Deer, elk, caribou, and moose have solid horns with branches. Horns are shed each year.
* Some can survive a long time without drinking water.
* Giraffe is the tallest animal on Earth today.
  + Limited to the tropical grasslands (the savannas) of Africa.
  + Can close their nostrils completely.
  + Uses its long upper lip and dark gray tongue to get food from tall trees.
  + Tongue has built-in sunscreen that protects it from the sun.
  + Cannot swim.
  + Have been hunted for food and the hide for making sandals. The tail is used to make ornaments, string, and fly swatters.
* The horn of the rhinoceros is sold in the Middle East for daggers and Asian folk medicine.

**Trunk-Nosed Mammals**

* African and Asian Elephants
  + Only trunk-nosed animals alive today.
  + Largest land mammals.
  + Entirely vegetarian.
  + Intelligent animals.
  + Elaborate means of communication
  + Protected by the nations who are party to the Convention on International Trade in Endangered Species.
  + *Asian Elephants*
    - Only found in India, Sri Lanka, and Southeast Asia.
    - Arched back, enormous domed head with relatively small ears, and a single “finger” at the tip of its trunk.
    - Only the males have trunks.
  + *African Elephants* 
    - Only found south of the Sahara Desert in Africa.
    - Slightly larger than the Asian Elephant.
    - Has a swayed back, tapering head with large ears, and two trunk “fingers”.
    - Ears are used as fans to cool the body.
    - Both male and female have tusks.

**Flying Mammals**

* Bats
  + Skin is attached to the side of the body, the back legs, and the tail.
  + Large wingspread.
  + Cannot walk very well.
  + Usually drink and fed in flight.
  + Flies at night.
  + During the day it stays in a cave or a dark place.
  + Hangs upside down by the claws on its back legs.
  + Most eat insects.
  + Vampire bat
    - Feeds on the blood of large animals.
    - Does not suck blood, rather laps it up with its long tongue.
  + Not blind.
  + Extensively killed by humans.
  + Habitats frequently destroyed.
  + Can hear very well through echolocation.

**Marine Mammals**

* Whale, dolphin, and porpoise
  + Have lungs, and breathe air.
  + Spend their lives in the ocean.
  + Feed on plankton, fish, and other marine life.
  + Use tails for swimming and finlike front limbs for balance.
  + Have one or two young at a time.
  + Orca
    - Fast swimming “killer whale”.
    - Most varied diet of any large ocean predator.
    - Most feared.
    - Only whale to hunt other warm-blooded animals.
    - Found in every ocean.
  + Blue whale
    - Largest animal to ever live on Earth.
    - Threatened by extinction, which is human-induced.
  + Now protected by international agreements, although enforcement of the agreements is a problem.

**Flexible-Fingered Mammals: The Primates**

* Lemur, monkey, gibbon, orangutan, bonobo, chimpanzee, gorilla, and human.
* Primates
* Round head and flat face.
* Complex brain.
  + Diverse behavior and social interaction.
* Highly developed sense of vision.
* Tree dwellers
* Flexible joints and nails rather than claws.
* Shoulder and hip joints of primates are adapted for flexible movement in varying directions.
* Many members of this group are endangered or potentially endangered.
  + Highly limited habitats.
  + Killed by humans.
    - Sport, medical purposes, and food.
  + Members of this group are protected by national parks and preserves and through international agreements.